

[0029] In addition, the energy storage portion may include a power circuit, a super capacitor, or a battery.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[0031] FIG. 1 is a view illustrating an exterior of a display device;

[0032] FIG. 2 is a view illustrating a structure in which a pipe and a light emitter are installed in the display device;

[0033] FIG. 3 is a cross-sectional view illustrating a structure in which the pipe is coupled to the light emitter;

[0034] FIG. 4 is a cross-sectional view illustrating one embodiment of a structure of the display device;

[0035] FIGS. 5 to 10 (FIGS. 5, 6, 7, 8, 9 and 10) are views illustrating a configuration of the pipe in detail;

[0036] FIG. 11 is a cross-sectional view illustrating another embodiment of a structure of the display device;

[0037] FIG. 12 is a view illustrating a configuration of a display system;

[0038] FIG. 13 is a view for describing a method of energy harvesting in the display system;

[0039] FIGS. 14 to 16 (FIGS. 14, 15 and 16) are views illustrating one embodiment of a shape of a pipe;

[0040] FIGS. 17 to 20 (FIGS. 17, 18, 19 and 20) are views illustrating another embodiment of a shape of a pipe; and

[0041] FIG. 21 is a view illustrating still another embodiment of a shape of a pipe.

DETAILED DESCRIPTION

[0042] Purposes, specific advantages, and novel features of the present disclosure will be clear from exemplary embodiments and the following detailed descriptions in connection with the accompanying drawings. In this specification, when reference numerals are assigned to components of each drawing, it should be noted that, the same numerals are assigned to the same components when the same components are illustrated in different drawings whenever possible. In descriptions of the present disclosure, when detailed descriptions of related well-known technology are deemed to unnecessarily obscure the gist of the present disclosure, they will be omitted. In this specification, although the terms first, second, etc. are used to distinguish one component from another, these components are not limited by these terms.

[0043] Hereinafter, an exemplary embodiment of the present disclosure will be described with reference to accompanying drawings in detail. Like reference numerals refer to the like elements throughout. The embodiments are described below to explain the present invention by referring to the figures.

[0044] FIG. 1 is a view illustrating an exterior of a display device.

[0045] Referring to FIG. 1, a display device 100 is a device which displays data such as an image by emitting light according to an input image signal and may include a main body 101, a display panel 110 configured to display the image, a front frame 120 configured to support the display panel, and a support 130 configured to support the main body 101.

[0046] Here, the display device 100 may include a liquid crystal display (LCD) device, an electro-luminescence display (ELD) device, a field emission display (FED) device, a plasma display panel (PDP), a thin film transistor LCD (TFT-LCD), a flexible display, an organic light emitting diode (OLED) display, or a cathode ray tube (CRT) display, but the display device 100 is not limited thereto.

[0047] In addition, when the display device 100 is a wall-hanging type, the support 130 may be omitted.

[0048] FIG. 2 is a view illustrating a structure in which a pipe and a light emitter are installed in the display device, FIG. 3 is a cross-sectional view illustrating a structure in which the pipe is coupled to the light emitter, and FIGS. 4 and 11 are cross-sectional views illustrating a structure of the display device.

[0049] Referring to FIG. 2, the display device 100 may include the main body 101, the display panel 110, a bottom chassis 140 forming a rear surface of the main body 101, a light emitter 160 configured to emit light for displaying an image on the display panel 110, electrodes 170 provided in a pipe 150 and polarized, and the pipe 150 disposed adjacent to the light emitter 160 and having a conductive fluid and gas therein, wherein heat is generated to move the conductive fluid inside the pipe 150 when the light emitter 160 emits light, and electricity is generated while the conductive fluid moves and passes around the electrodes.

[0050] The light emitter 160 may be formed with a light emitting diode (LED). As illustrated in FIG. 2, the LED may be bar type. The light emitter 160 may also be a self-luminous type such as an OLED and will be described in detail below.

[0051] The gas may be formed in the form of bubbles.

[0052] The pipe may be a pulsating heat pipe.

[0053] In addition, the pipe 150 is in the form of a closed circuit filled with a conductive fluid and gas, and as light is emitted by the light emitter 160, the conductive fluid may pass through a region in which the electrodes 170 are formed and may generate electricity when heat is transmitted. As illustrated in FIG. 2, a pattern of the electrodes 170 may be formed on an outer surface of the pipe 150.

[0054] Referring to FIG. 3 which is a cross-sectional view taken along line A-A' of FIG. 2, the pipe 150 may be disposed between the light emitter 160 and the bottom chassis 140. Here, coupling grooves 141 may be formed in the bottom chassis 140 such that the pipe 150 is inserted into a surface in contact with the pipe 150.

[0055] A structure in which the bottom chassis 140, the pipe 150, and the light emitter 160 are coupled to each other may be a structure in which a light guide plate 181, a light conversion layer 183 disposed on the light guide plate, a circuit board 185 on which electronic components 187 are mounted, and the display panel 110 are coupled to each other as illustrated in FIG. 4. The structure of the display device 100 illustrated in FIG. 4 is an example of a case provided with a backlight.

[0056] Here, the light guide plate 181 may be a configuration for guiding light incident from the light emitter 160 to the light conversion layer 183.

[0057] The light conversion layer 183 may be installed to be spaced apart from the light emitter 160 and may be a configuration which converts light incident from the light emitter 160 to white light and emits the white light toward the display panel 110.